MASTER ENVIRONMENTAL LIBRARY (MEL)

TECHNICAL REFERENCE GUIDE

Characteristics and Performance

Defense Modeling and Simulation Office
Washington, DC

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Version 1.0

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FOREWORD

The Department of Defense (DoD) Modeling and Simulation Master Plan (MSMP), DoD 5000.59-P, October 1995, identifies objectives for providing authoritative representations of the natural terrain, oceanographic, atmospheric and near-space environments; and assigns execution responsibilities to Modeling and Simulation Executive Agents (MSEAs). The Undersecretary of Defense for Acquisition and Technology has designated the Defense Mapping Agency (now part of the National Imagery and Mapping Agency), Department of the Air Force, and Department of the Navy as MSEAs for terrain, atmosphere and near-space, and ocean environments respectively.

The Master Environmental Library (MEL) project is a major part of the Modeling and Simulation community's initiative to provide authoritative representations of the natural environment. This document provides a handy reference source for technical information regarding the MEL project.

This document will be reviewed and updated by the MSEAs as required to maintain its currency. Comments and recommendations should be forwarded for review and possible inclusion to:

Office of the Ocean Executive Agent
Naval Research Laboratory
Code 7306
4555 Overlook Ave. SW
Washington, DC 20375
(202) 404-1426

RECORD OF CHANGES

Change Number	Date of Change	Change Description	Date Entered	Entered by

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NOTE: Conventions

This manual uses the following typographical conventions:

CAPITAL LETTERS for the names of Internet protocols, acronyms, and abbreviations.

Boldface type for references to other sections in this guide.

Italic font for emphasis and document titles.

`Monospaced` font for keywords in computer system commands, directory path names, and file names.

In proper context, the text in [square brackets] represents command options and text in <angle brackets> represents items the user should replace with applicable text.

`Monospaced italic` font for Internet addresses.

SECTION 1. INTRODUCTION

1.1 PURPOSE

This *Technical Reference Guide* is designed to provide information about the Master Environmental Library (MEL) project. It is intended for use as a reference by MEL project representatives and MEL Resource Site Administrators. This document will be reviewed and updated as necessary.

1.2 BACKGROUND

MEL MISSION

To support the warfighter and national decision makers, with outreach to the non-DoD and commercial communities, through direct and timely access to natural environmental information, products and data that support a common interoperable view of the battlespace and help ensure battlespace dominance, and through the supply of natural environmental information, products, and data to models and simulations for training, analysis, and acquisition.

Objective Two of the *Modeling and Simulation Master Plan (MSMP)* is to provide timely and authoritative representations of the natural environment, which includes terrain, oceanographic, atmospheric and near-space information. The MEL project supports this objective by providing users with direct and timely access to natural environmental information, products and data for battlespace modeling, simulation, management, planning, training, and development The MEL project is sponsored by the *Defense Modeling and Simulation Office (DMSO)*, under direction of *Modeling and Simulation Executive Agents (MSEAs)* for Air and Space, Oceans, and Terrain. A more detailed chronological history of the MEL project is given in **Appendix A**.

SECTION 2. MEL OVERVIEW

MEL is an Internet-based information discovery and retrieval system providing access to oceanographic, meteorological, terrain, and near-space data sets. As shown in Figure 1, it is based on a library model under which users query a *"card catalog."* In the case of MEL, the *"cards"* are metadata records retrieved by the MEL Access Site that help users locate and choose the *"books"* or data sets. These data sets include real and potential data at geographically-distributed MEL Resource Sites.

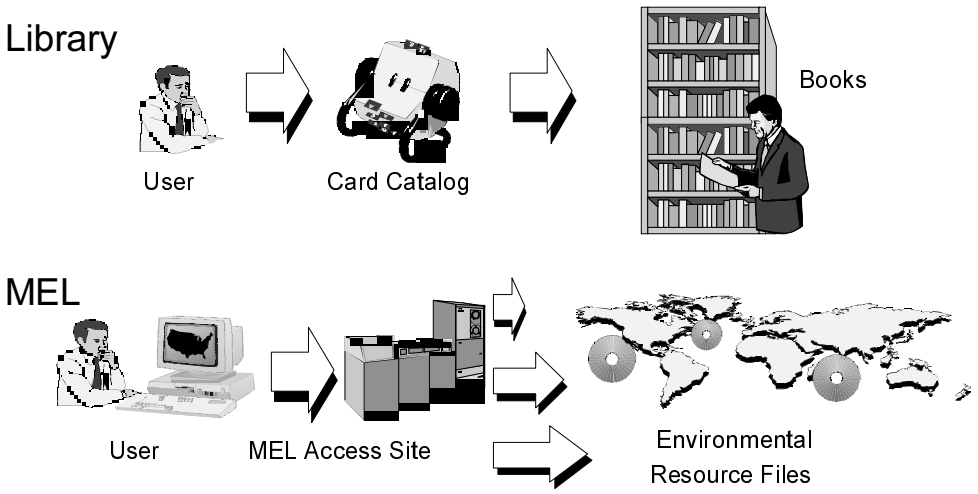

Figure 1. MEL Library Model

MEL Access Sites provide an Internet Hypertext Transfer Protocol (HTTP) Server (also known as a *Web server*), and the Common Gateway Interface (CGI) software needed to support Hypertext Markup Language (HTML) and Java™ query interfaces. The MEL Resource Sites are information repositories that provide access to their local data sets.

MEL users search for and order available data using commercially available World Wide Web (WWW) browsers. Users may choose either HTML or Java™ interfaces to interactively create a *query*, browse the query results, and then place an order for data. These queries can define: a region of interest, date range, category keywords, and database (to be searched). Queries perform a parallel check of all the metadata records for the specified databases. Search results are displayed in response to these queries, and users can examine the full text of the metadata records, view the browse graphics associated with metadata records, or link directly to an on-line resource that provides access to the data. An on-line resource can be: a Uniform Resource Locator (URL) pointing to the data set, a MEL custom order form, or some other order process from the Resource Site supplying the data.

Java queries also provide an interactive interface that promotes visual comparison of query results, to guide requesters through potentially large sets of criteria-matching data to ones of specific interest to them. MEL users may order existing information, request creation of certain data, or subscribe to automatically receive regularly-produced information.

MEL custom orders are processed off-line. A MEL Access Site automatically sends them to applicable Resource Site(s) via electronic mail (e-mail), where they are processed by MEL Resource Site Software (MRSS) or alternatively by that Site's own order processing system. MEL Resource Sites using the MRSS provide a *choice specification* parameter in their metadata records which is used by MEL Access Site to create a custom order form for the data set. The order form provides users with appropriate choices needed to order the data set, such as the desired geographic area, time frame, parameters, levels, etc. The MRSS is customizable software written in Perl, that permits scheduling and processing of orders through states of access control, data extraction from local databases, formatting, compression, encryption (if needed), delivery, and e-mail notification of delivery.

MEL Resource Sites are encouraged to provide data in standard formats, such as:

- Binary Universal Form for Representation (BUFR) of meteorological data
- Gridded Binary (GRIB) for gridded weather and ocean data
- National Imagery Transmission Format Standards (NITFS) for imagery data
- Vector Product Format (VPF) or Digital Terrain Elevation Data (DTED) for gridded terrain data
- Hierarchical Data Format (HDF) for scientific data

Each Resource Site may also offer other formats. The requested information is delivered to the user-specified anonymous File Transfer Protocol (FTP) server or it is posted to the Resource Site's anonymous FTP server for downloading by the user at a later time[1].

A key feature of MEL is that Resource Sites maintain complete control over their data and access to it. The MRSS supports access control lists and user authentication and has the capability to accept custom authentication modules. Data centers do not need to change their data management policies or architectures to become a Resource Site. The primary requirement for becoming a MEL Resource Site is to provide descriptions of the available geospatial data sets using the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM), and/or descriptions of the available non-geospatial information (e.g., documents, algorithms and tools) using the Government Information Locator Service (GILS) metadata standard.

[1] Data orders that are too large for efficient electronic delivery may be sent by other means, e.g., mail. Users with large data orders will be contacted by the MEL Resource Site to arrange data delivery.

SECTION 3. MEL ARCHITECTURE

The *metadata records* function as the common denominator among different types of information available via MEL. These records comply either with the FGDC CSDGM or GILS metadata standard, and provide information about data sets, documents, algorithms, and tools in MEL.

MEL architecture is based upon federal and internationally recognized standards. It combines the design features of the FGDC's National Spatial Data Clearinghouse with a generic data ordering and delivery system. Use of the MRSS ordering and delivery system is optional for Resource Sites, which may choose to link to existing ordering systems. One benefit of the MRSS ordering system is that users need only learn one interface, instead of different ordering interfaces for various sites. Figure 2 shows a high-level schematic of MEL Architecture.

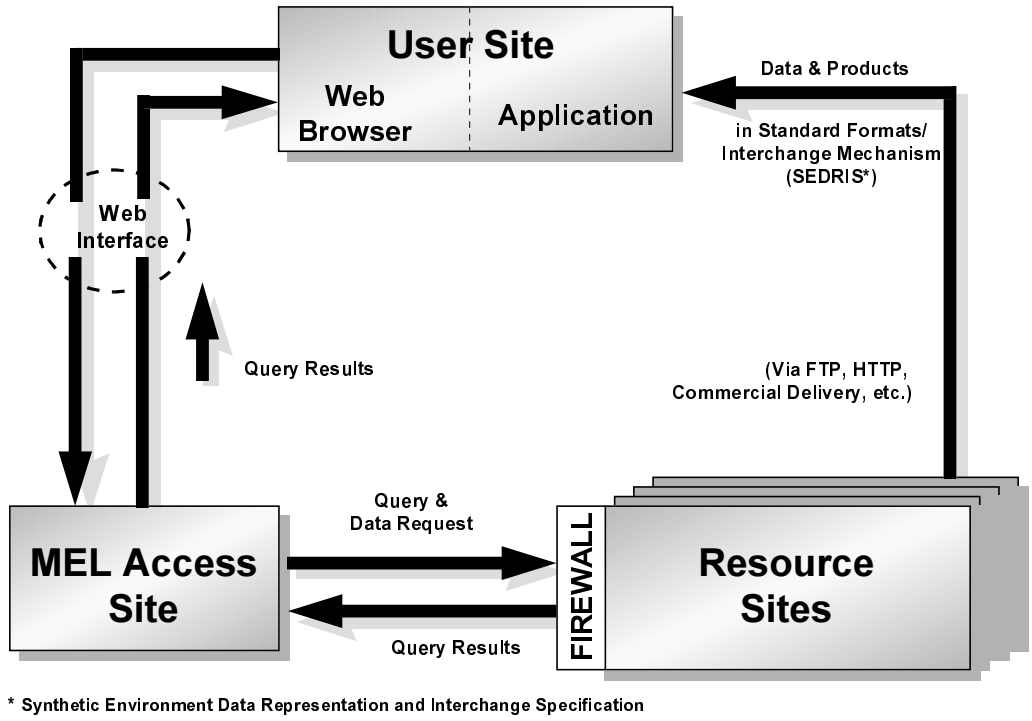

Figure 2. MEL Architecture

A MEL Access Site provides a search and order interface to distributed Resource Sites. The data sets of these Resource Sites are described by metadata records using the FGDC CSDGM and GILS formats. These metadata records are indexed using Wide Area Information Servers (WAIS) software, and are made available to Internet WAIS search clients that communicate using the WAIS standard protocol (an early version of ANSI Z39.50[2] **)**. Metadata records and search indexes are managed locally by MEL Resource Sites. Activities can become MEL Resource Sites without changing their local data management methods or architecture, except to maintain metadata records for data sets they provide via MEL and to install the MRSS to facilitate data discovery and delivery.

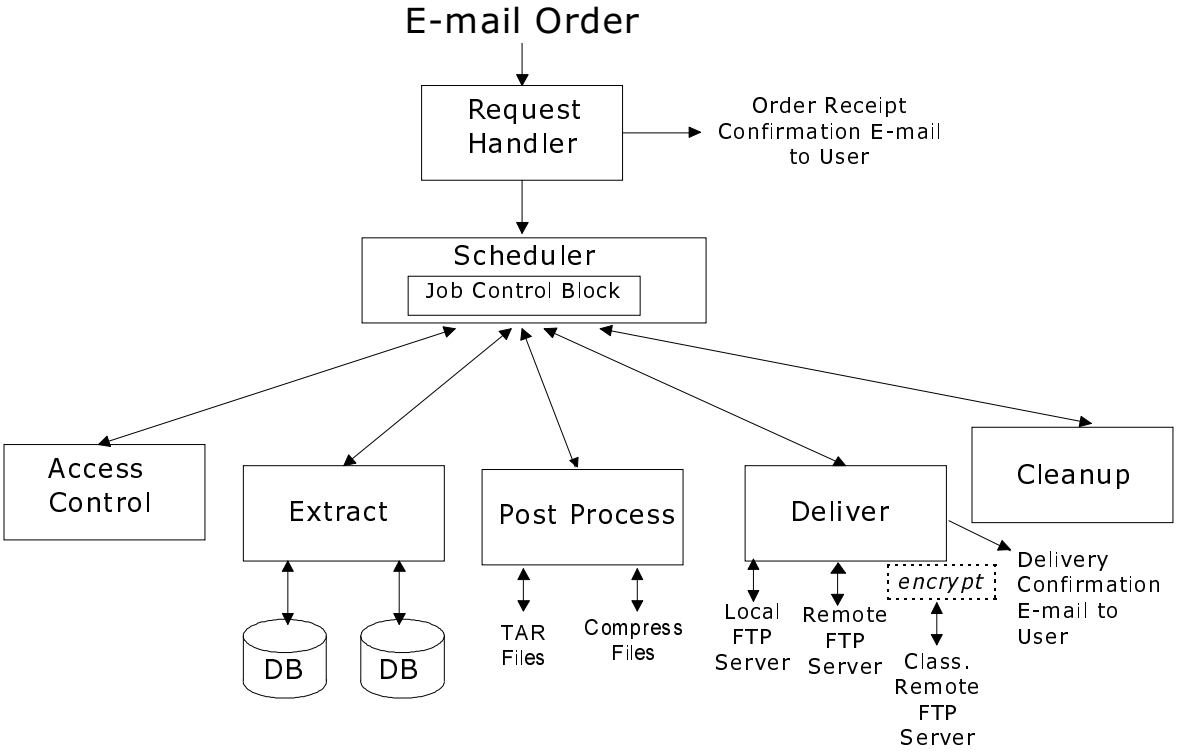

Figure 3. MRSS Functions

Orders for data are transferred to MEL Resource Site(s) via electronic mail (e-mail) and are processed by the MRSS. Figure 33 shows the major functions of the MRSS. The MEL order process provides a method for creating order forms for the data described in the metadata as well as a system to process the orders. A MEL *Choice Syntax* is used to describe the choices a user must make to order a dataset. The choices, contained with the metadata, are used to specify how a dataset can be subdivided or modified for the user. Based on this specification, the Access Site creates an HTML order form on-the-fly. Order forms can contain clickable maps, date range specifications, text entry boxes, single and multiple choice lists, and hyperlinks to ancillary information. Upon

[2] ANSI/NISO Z39.50-1992, Information Retrieval Application Service Definition and Protocol Specification for Open Systems Interconnections

submission of an order form, the Access Site generates an order request message for the Resource Sites using the MEL order syntax[3]. Data can be delivered by two methods:

- Transfer to a user-designated FTP server (Remote FTP Server in Figure 33)
- Transfer to the Resource Site FTP Server for later downloading by the user (Local FTP Server in Figure 33)

MEL architecture will also support real-time HTTP ordering and delivery for data sets that are not too large.

As Figure 22 showed, MEL design is based on a three-tiered architecture that provides scalability, load management, and replacement of functional parts as technologies advance or mature. The First Tier consists of a User, a Commercial-Off-The-Shelf (COTS) web browser application, and a delivery site (optional). The Second Tier includes MEL Access Site's query form, results, and order form interface, along with the Resource Site's order parser, access control and job scheduler. The Third Tier consists of the Resource Site's databases, extraction, and delivery processes. Unlike two-tiered client/server architectures that can bog down as the number of clients increases, a three-tiered architecture can balance the workload by sending jobs to different servers and scheduling order processing.

Use of a COTS web browser and HTML provides a nearly platform-independent user interface. There is no need to maintain multiple versions of user interface software for different platforms. Use of the FGDC and GILS metadata standards allows searching for common attributes in databases of various designs and implementations. MEL ordering syntax and the MRSS provide a generic data ordering and delivery system that can be tailored for each Resource Site's needs. MEL Resource Sites maintain complete control over user access to their data.

In the future, MEL will incorporate a MEL Services Application Programming Interface (API) that will allow application developers to add MEL functionality (i.e., query, order, subscription, order status, and cancellation features) without having to use the Web interface.

[3] Some Resource Sites have pre-existing on-line ordering processes and do not use the custom MEL ordering system. These Resource Sites may fill a data order by a direct download of the data to the user.

SECTION 4. TYPICAL MEL PROCESS

4.1 OVERVIEW

a. Connect to MEL Access Site using Web browser (*http://mel.dmso.mil*)

b. Select HTML or Java Query

c. Specify the Area of Interest

d. Specify the Date Range

e. Optionally, specify keywords for search

f. Specify the desired Resource Site(s) or accept default of "All"

g. Submit the Query

h. Review metadata "hits" headlines

i. The Java interface offers an additional step at this point called the QueryResults Applet. This step uses visualization and interactive tools to allow the user to delete items from the Query Results that are not of interest.

j. Select individual metadata headlines of interest to view associated metadata

k. Review the metadata file

l. Select **Generate Order Form** (if one wishes to order data)

m. Load or Create a User Profile

n. Fill in the order form

o. Submit an order or subscription for the described dataset, or return to the metadata "hits" headlines to review other metadata files

p. Receive the order confirmation via e-mail

q. Receive confirmation of dataset delivery via e-mail

r. Download the dataset from an FTP Server

s. Untar and/or expand dataset (if necessary)

t. Dataset is now ready for use

4.2 QUERY WORK FLOW

MEL Query work flow is shown in Figure 4, with the HTML Query flow depicted on the left and the Java Query flow on the right. This process is a combination of CGI/Perl scripts and HTML pages generated on-the-fly for the user's display.

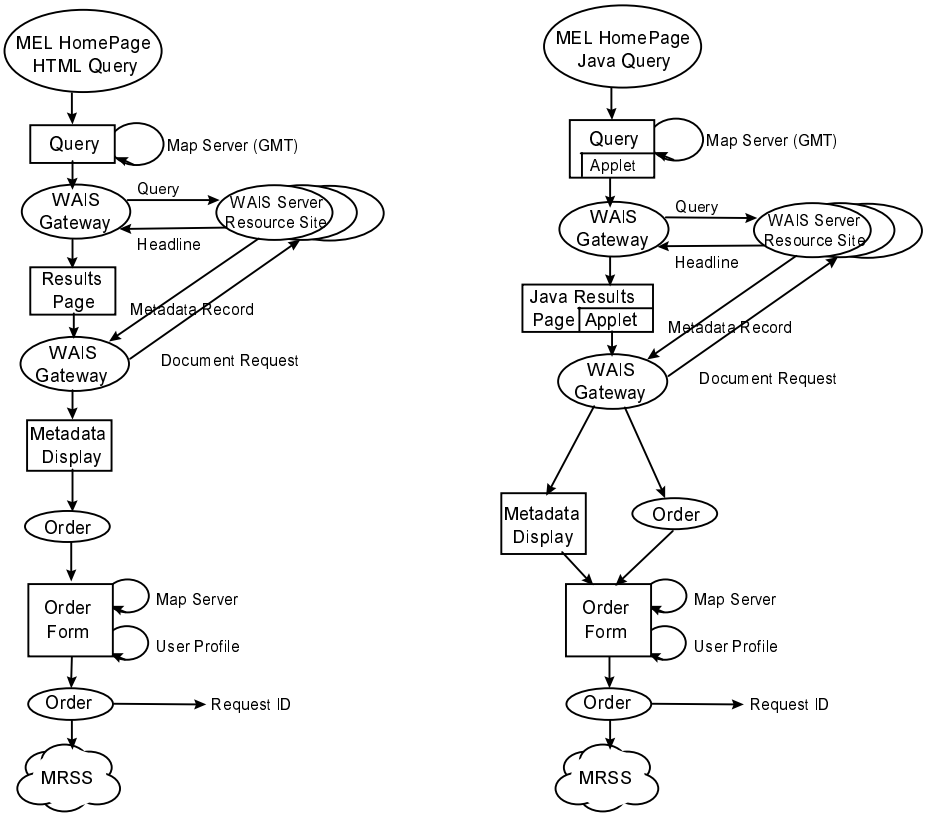

Figure 4. MEL Query Internal Workflow

SECTION 5. MEL SITES

Tables 1 and 2 list MEL Access and Resource Sites, respectively.

Table 1. MEL Access Sites

CURRENT SITES:[4]
Naval Research Laboratory, Marine Meteorology Division, Monterey, CA (NRL-MRY) *http://mel.dmso.mil*
National Imagery and Mapping Agency (NIMA), Bethesda, MD *[Classified Site]* *http://204.37.97.214/atlas/mel/homepage.html*

Table 2. MEL Resource Sites

CURRENT SITES:
Air Force Combat Climatology Center (AFCCC), Scott AFB, IL
Air Force Weather Agency (AFWA), Offutt AFB, NE
Mississippi State University, Center for Air-Sea Technology (MSU CAST), Stennis Space Center, MS
National Geophysical Data Center (NGDC), Boulder, CO
National Imagery and Mapping Agency (NIMA), Bethesda, MD[5] *[Classified site]*
National Imagery and Mapping Agency (NIMA), Fairfax, VA[6] *[Unclassified site]*
Naval Research Laboratory, Marine Meteorology Division, Monterey, CA (NRL-MRY)
Simulator Data Base Facility (SDBF), Kirkland AFB, NM

[4] MEL Access Sites will be moved to the Modeling and Simulation Operational Support Activity (MSOSA) by September 1998.

[5] The NIMA Classified MEL Resource Site is scheduled to move from Bethesda, MD to St. Louis, MO by March 1998.

[6] The NIMA Unclassified MEL Resource Site is scheduled to move from Fairfax, VA to Bethesda, MD by July 1998.

FUTURE SITES:
Naval Oceanographic Office (NAVOCEANO), Stennis Space Center, MS
U.S. Army Topographic Engineering Center (TEC), Alexandria, VA
CANDIDATE SITES
Air Force Research Laboratory (AFRL), Hanscom AFB, MA
Army Research Laboratory , Battlefield Environment Division (ARL/BED), Adelphi, MD
Coastal and Hydraulics Laboratory (CHL), Vicksburg, MS
Terrain Simulator Center, Seventh Army Training Command (7ATC), U.S. Army Europe, Grafenwöhr, Germany

SECTION 6. MEL POINTS OF CONTACT

Tables 3 through 6 list the Points of Contact for assistance in various management, technical, and operational areas. General installation questions should be e-mailed to:

mel_support@nrlmry.navy.mil

Table 3. Program Management Points of Contact

Subject Area or Site	Name	E-mail
Director, DMSO	CAPT Jim Hollenbach, USN	jhollenb@dmso.mil
Ocean Executive Assistant	Dr. Donna Blake	dblake@msis.dmso.mil
Air and Space Executive Assistant	CDR Tim Cummings, USN	cummingt@thunder.scott.af.mil
Terrain Executive Assistant	LTC Bruce Donaldson, USA	donaldsb@nima.mil
Project Leader	Dr. Richard Siquig	siquig@nrlmry.navy.mil

Table 4. Project Management Points of Contact

Subject Area or Site	Name	E-mail
Project Leader	Dr. Richard Siquig	siquig@nrlmry.navy.mil
Assistant Project Leader	Dr. Fred Newman	fred.newman@jhuapl.edu
Task Leader - Software Engineering	Chuck Stein	stein@nrlmry.navy.mil
Task Leader - Resource Interfaces	Rick Allard	allard@nrlssc.navy.mil
Task Leader - Customer Services	Dr. John Spencer	spencer@rsd.nrl.navy.mil
Task Leader - Project Management	Dr. Richard Siquig	siquig@nrlmry.navy.mil

Table 5. Technical Points of Contact

Subject Area	Name	E-mail
Project Leader	Dr. Richard Siquig	siquig@nrlmry.navy.mil
Technical Lead	Chuck Stein	stein@nrlmry.navy.mil
Software Lead	Alex Matiyevsky	matiyevs@nrlmry.navy.mil
MEL Access Site Software (MASS)	Chuck Stein Alex Matiyevsky Dr. Naim Alper	stein@nrlmry.navy.mil matiyevs@nrlmry.navy.mil alper@lightspeed.bc.ca
MRSS Software	Billy Chambless	billy@cast.msstate.edu
HTML Interface Dev.	Dr. Naim Alper	alper@lightspeed.bc.ca
Java Interface Dev.	Dr. Naim Alper	alper@lightspeed.bc.ca
MEL WWW Interface	Dr. Marie White	white@nrlmry.navy.mil
Webmaster	John Kent	kent@nrlmry.navy.mil
Security/PGP	John Kent	kent@nrlmry.navy.mil
Metadata Records	Dr. Janice Boyd	janice.boyd@nrlssc.navy.mil
Administrator Tools	John Kent	kent@nrlmry.navy.mil
BUFR Data Encoding/Decoding	Dr. Louis Hembree	hembree@nrlmry.navy.mil
GRIB Data Encoding/Decoding	Steve Lowe	steven.j.lowe@cpmx.saic.com
MEL Product Dev.	Steve Lowe	steven.j.lowe@cpmx.saic.com
Documentation	Ben Holt	bholt@marinc.com

Table 6. Operational Points of Contact

Subject Area or Site	Name	E-mail
Installation & Checkout		mel_support@nrlmry.navy.mil
NRL-MRY Access Site Administrator	John Kent	kent@nrlmry.navy.mil
7ATC, Germany Resource Site Administrator	Erik Patton	pattone@email.grafenwoehr.army.mil
AFCCC Resource Site Administrator	Capt John Werner, USAF	werner@thunder.scott.af.mil
AFRL Resource Site Administrator	Steven Ayer	ayer@meltemi.plh.af.mil
AFWA Resource Site Administrator	Tsgt Tim Webb, USAF	webbt@afgwc.af.mil
CAST Resource Site Administrator	Billy Chambless	billy@cast.msstate.edu
NGDC Resource Site Administrator	Eric Kihn	eak@ngdc.noaa.gov
NIMA Resource Site Administrator	Mike Papirtis	MFPapirtis@tasc.com
NRL-MRY Resource Site Administrator	Cindy Curtis	curtis@nrlmry.navy.mil
SDBF Resource Site Administrator	Donald Lien	sdbf@sdbf.irk.aetc.af.mil
TEC Resource Site Administrator	Janice Stewart	stewart@tec.army.mil

SECTION 7. HARDWARE REQUIREMENTS

7.1 MANDATORY FOR USERS

a. 16-bit processor

b. Random Access Memory (RAM) — 8 MB

c. 8-bit color capability (256 colors)

d. Pointing device

e. Internet connectivity with sufficient bandwidth to allow acceptable interactive use of Web browser

7.2 RECOMMENDED FOR USERS

a. 32-bit processor

b. Random Access Memory (RAM) — 32 MB

c. Graphics accelerator video card

d. 16-bit color capability (65,536 colors)

e. Integrated Services Digital Network (ISDN) or faster Internet connection

7.3 MANDATORY FOR RESOURCE SITES

a. RAM — at least 32 MB

b. Hard Disk Capacity — 9 GB

c. UNIX Server (or 32-bit processor PC running Linux)

d. Reliable Internet connection providing sufficient bandwidth

7.4 RECOMMENDED FOR RESOURCE SITES

a. RAM — 128 MB

b. Available Hard Disk Capacity — 3 hard disks, each of 9 GB storage capacity. All three disks should be of the same make and model. One of these disks should be kept off-line as a spare.

c. Processor — Computer class equivalent to or better than Sun SPARC 20

d. Reliable, full-time T-1 Internet connection

7.5 MANDATORY FOR ACCESS SITE

a. RAM — 64 MB

b. Hard Disk Capacity — 2 GB of open storage

c. UNIX Server — Computer class equivalent to or better than Sun SPARC 10

d. Reliable, full-time fractional T-1 Internet connection

7.6 RECOMMENDED FOR ACCESS SITE

a. RAM — 256 MB

b. UNIX Server — Computer class equivalent to or better than SGI WebFORCE™ Origin200 Server with 2x180 MHz R10000 processors and 1 MB of Cache.

c. Reliable, full-time T-1 Internet connection

SECTION 8. SOFTWARE REQUIREMENTS

The software applications in this section are available through hyperlinks at the following URL: *http://mel.dmso.mil/software.html*

8.1 MANDATORY FOR USERS

a. HTML 3.2-compliant Web Browser *(primary interface)*

b. Compression software/applications *(to expand compressed and tarred data sets)*

8.2 RECOMMENDED FOR USERS/REQUIRED BY SOME RESOURCE SITES

a. Java enabled Web browser

b. Pretty Good Privacy (PGP) encryption/decryption software *(if data encryption is desired)*

c. Encoder/Decoder applications/files *(to decode GRIB/BUFR/HDF/NITFS/etc. data sets)*

d. FTP Client software *(if Web browser does not have FTP function)*

8.3 MANDATORY FOR RESOURCE SITES

a. HTTP Server (Web Server) application

b. ANSI C compiler

c. GNU Zip file compression utility

d. freeWAIS-sf-2.0.65 WAIS Server

e. Perl 5.003 or higher

f. Pretty Good Privacy (PGP) 2.6.2 or higher

g. CGI.pm

8.4 RECOMMENDED FOR RESOURCE SITES

a. Apache HTTP Server

b. Encoders/Decoders as needed

8.5 MANDATORY FOR ACCESS SITES

a. HTTP Server (Web Server) application

b. Perl 5.003 or higher

c. ANSI C compiler

d. CGI.pm

e. Ghostscript

f. ImageMagick (converts postscript files to GIF files)

g. Generic Mapping Tool (GMT)

h. NetCDF

i. freeWAIS-sf WAIS Server (included in MASS distribution file)

j. Pretty Good Privacy (PGP) 2.6.2 or higher

k. GNU Zip file compression utility

SECTION 9. MAILING LIST PROCEDURES

9.1 POSTING A MESSAGE TO A LIST

To send an e-mail message to a list, send e-mail to:

<*listname*>@nrlmry.navy.mil

where <*listname*> is a name from **paragraph 9.3** below. For example,

mel_comments@nrlmry.navy.mil

9.2 SUBSCRIBING TO A MAILING LIST

To subscribe to a Mailing List, send an e-mail message using the following format:

```
To:  majordomo@nrlmry.navy.mil

Subj: [leave blank]

subscribe <listname>
```

(where <listname> is the MEL Mailing List chosen from paragraph 9.3 below)

9.3 MEL MAILING LISTS

mel_support..... Technical support for installation of MEL software

mel_bugs ..... Report bugs in MEL software

mel_comments..... General technical support questions, general comments, suggested enhancements

mel_developers ..... General forum for MEL development team

mel_metadata..... General forum for metadata items

mel_products..... Comments and questions on MEL products

mel_grib ..... General forum for Gridded Binary code form

mel_bufr ..... General forum for BUFR code form

SECTION 10. EXAMPLE - ORDERING MEL DATA

10.1 DATA DISCOVERY PROCEDURES

Follow these steps to discover available data in MEL:

1. Type the MEL URL (*http://mel.dmso.mil*) in the browser address box.

2. Click **HTML Query**. MEL users may pick either the HTML Query or the Java Query to search for and order data. This example will use the HTML Query.

3. The "HTML Query" form will be displayed.

    a. Scroll down to "Region of Interest." This area is used to narrow the search to a specific area, but leave the default settings for this example.

    b. Scroll down to "Time Range." This area is used to narrow the search to a specific time range, but leave the default settings again.

    c. Scroll down to "Keywords." This area is used to narrow the search to metadata records containing the user-specified keywords, but leave the default settings again.

    d. Scroll down to "Databases," the default selection is **All**. To speed up the search for this example, select a specific Database by clicking **Specific** and then scroll down to and click **NRLMRY** in the Database list.

    e. Scroll down and click **Submit Query**.

4. The "Metadata Query Results" page will be displayed, showing all the "hits" from the NRL Monterey database that met the search criteria.

    a. For this example, the product of interest is the Naval Operational Regional Atmospheric Prediction System (NORAPS) model data for Asia.

    b. Scroll down until **NORAPS Asia** is visible, and select it.

10.2 DATA ORDERING PROCEDURES

Follow these steps to order data from MEL:

1. The metadata record for the NORAPS Asia data is now displayed.
    a. Scroll down the metadata record to learn more about the data set.
    b. To order the data set, scroll back to the top and click **Generate Order Form**.[7]
2. The "Data Request Form" is now displayed.
    a. Click **Load User Profile**.
3. The "Load/Create/Change User Profile" form is displayed.
    a. If you have ordered MEL data before, type your e-mail address in the "Email" box and click **Load**. *Now proceed to Step 5*.
    b. If this is your first time ordering data, you must create a user profile as follows:
        i. Type your e-mail address in the "Email" box, *do not* click **Load**.
        ii. Type a password of your own choice in the first "Password" box.
        iii. Type the same password in the second "Password" box for verification. (Write this password down and keep it secure)
        iv. Click **Create Profile**.
        v. Proceed to *Step 4*.
4. The "User Profile" form is displayed.
    a. Type your name in the "Name" box.
    b. The "Email" box should already contain your e-mail address.
    c. The "Delivery Method" list offers two choices – "FTP delivery" or "FTP pickup."

[7] Some Resource Sites use pre-existing data ordering systems. In this case, the Generate Order Form button will be replaced by instructions directing the user to the Resource Site's ordering system.

i. If you have an anonymous FTP server at your site, then select "FTP delivery." Be sure to put the **correct** FTP address and directory for your site in the "Anonymous FTP" box. Data will be delivered to this directory.

ii. If you do not have an anonymous FTP server/directory at your site, then select "FTP pickup." The data will then be placed on the Resource Site FTP server/directory for later download by you. When the ordered data has been transferred, e-mail notification will be sent and will include the complete FTP URL, directory, and file name needed to retrieve the data.

d. "Confirmation" — Leave this option set to "EMAIL." This means e-mail confirmation of order receipt and data delivery will be sent to the requester.

e. "PGP Encrypt Data" — This option indicates whether or not the data will be PGP encrypted (see **Appendix C-PGP**) for delivery. If encrypted data is desired, you must provide your public PGP key in the "PGP Key" box in the lower part of the form.

f. The next few items contain the user's organization, project, phone number, fax number, street address, city, state and zip code. Make all necessary changes.

g. Click **Add/Update Profile**.

5. The display returns to the "Data Set Request" form.

a. Each order can vary depending on which items the Resource Site has designated as divisible into subsets.

b. In the case of NORAPS_Asia, a "Time Range" can be specified, but leave the defaults for now.

c. In the "PARAMETER" list, select geop_ht@isbr_lvl.

d. In the "LEVEL" list, select 100hPa (isbr_lvl).

> **NOTE**: For this dataset a common error is to select invalid Parameter/Level combinations. For example, you cannot select pres@msl, then select an (isbr_level) from Levels. The parameter and level must be consistent. To see a list of all the available parameter/level combinations, select the "Valid Parameter/Level/Forecast Combinations" link.

e. In the "FORECAST_TIME" group, select the "analysis 000" checkbox.

f. The **Change delivery** option will return to the User Profile form to make appropriate changes. For this example, just review the delivery information and move on to the next section.

g. The "Request type" list has two options – **Get now** to place the order immediately or **Subscribe** to place a recurring order. For this example, leave the default option **Get now**.

6. Scroll to the bottom of the order form and click **submit order**.

7. If the display reads "MEL Data Request Acknowledgment", you have ordered information via MEL. If an "Error!" message is displayed, note the message and repeat the steps required.

8. Data will typically be delivered in one of the standard MEL formats. Encoders/Decoders software for these formats are available at:

   http://mel.dmso.mil/software.html#encoders_decoders

SECTION 11. MEL RESOURCE SITE PLATFORMS

Table 7. MEL Resource Site Platforms

Site	Platform	Operating System	MRSS
AFCCC	IBM RISC 6000	AIX 3.2.5	1.0
AFRL	SGI Indigo2	Irix 5.3	1.0
AFWA	Digital AlphaServer 2000 5/250	DEC UNIX 4.0a	1.0
AFWA	Sun SPARCstation 2	Solaris 2.5.2	1.0
AFWA	Micron XRU	OpenLinux Base 1.1	1.1
ARL	Axil 320 (SPARC 20 clone)	SunOS 5.4 (Solaris 2.4)	1.1
CAST	Sun SPARCcenter 1000	SunOS 5.4 (Solaris 2.4)	1.1
CHL	HP	HPUX	1.0
NAVOCEANO	HP 9000/800 (TAC 3)	HPUX 9.01	1.1
NGDC	Sun SPARCcenter 2000	Solaris 2.4	n/a‡
NIMA (Classified)	Sun Netra	SunOS 5.5.1	1.0
NIMA (Unclassified)	Sun SPARCcenter 2000	Solaris 2.4	1.1
NRL MRY	SGI	Irix 6.2	1.1
SDBF	Sun SPARCstation 10	Solaris 2.4	n/a
TEC	Sun SPARCstation 20	Solaris 2.5	n/a
7ATC Germany	SGI Indy	Irix 5.3	n/a
‡ n/a indicates the Resource Site uses their own ordering system instead of the MEL order form			

APPENDIX A. MEL PROJECT CHRONOLOGY

8 Aug 1994..... MEL Memorandum of Agreement released

8 Aug 1994..... MEL Program Development Plan released

FY 1994 ..... MEL Project established

Oct 1995..... M&S Master Plan promulgated

13 Nov 1995..... MEL Access Site established

13 Nov 1995..... First MEL Resource Site established (MSU-CAST)

13 Nov 1995..... First Prototype demonstration

23 Jan 1996..... WAIS Upgrade (freeWAIS-sf 2.0.60)

27 Jan 1996..... WAIS Upgrade (freeWAIS-sf 2.0.61)

2 Feb 1996 ..... Server Upgrade (NCSA httpd 1.5a-export)

3 Mar 1996..... Working prototype of MEL Access Site at NRL Monterey

Apr 1996 ..... MASS Ver. 1.0 released

2 Jul 1996..... MRSS Ver. 1.0 released

30 Jul 1996..... MEL is registered node of MSRR

30 Jul 1996..... NIMA Resource Site on-line

Sep 1996 ..... AFWA Resource Site on-line

2 Oct 1996..... NGDC Resource Site on-line

7 Nov 1996..... Updated MEL Java interface

31 Dec 1996..... Upgraded Server to Netscape Enterprise Ver. 2.13

Jan 1997..... AFCCC Resource Site on-line

23 Apr 1997..... MRSS Ver. 1.1 released

14 May 1997..... Software Version Description (MRSS 1.1) released

1 Jun 1997..... NAVOCEANO Prototype Resource Site on-line

5 Jun 1997..... Software Center Operator Manual (MRSS 1.1) released

17 Jun 1997..... Software Test Plan released

8 Jul 1997..... MEL BUFR Library Ver. 2.0 released

15 Jul 1997..... MEL Software User Manual Ver. 1.0 released

30 Jul 1997..... MASS Ver. 1.1 beta released

1 Oct 1997..... NIMA Classified Access and Resource Sites on-line

APPENDIX B. ACRONYMS/ABBREVIATIONS

7ATC ..... Seventh Army Training Command, U.S. Army Europe, Grafenwöhr, Germany

A

AFB..... Air Force Base

AFCCC..... Air Force Combat Climatology Center

AFRL..... Air Force Research Laboratory

AFWA ..... Air Force Weather Agency

AIX ..... Advanced Interactive Executive, IBM's version of UNIX.

ANSI..... American National Standards Institute

API..... Application Program Interface

ARL ..... Army Research Laboratory

B

BED ..... Battlefield Environment Division

BUFR..... Binary Universal Form for the Representation of meteorological data

C

CA..... California

CAPT..... Captain (O6-US Navy)

Capt ..... Captain (O3-US Air Force, O3-US Marine Corps)

CAST..... Center for Air Sea Technology (Mississippi State University)

CDR..... Commander (O5-US Navy)

CGI..... Common Gateway Interface

CHL..... Coastal and Hydraulics Laboratory

CO..... Colorado

COTS..... Commercial Off-The-Shelf

CSDGM..... Content Standards for Digital Geospatial Metadata

D

DEC ..... Digital Equipment Corporation

DMSO..... Defense Modeling and Simulation Office

DoD..... Department of Defense

DTED ..... Digital Terrain Elevation Data

E

E-mail..... Electronic mail

F

FGDC ..... Federal Geographic Data Committee

FTP..... File Transfer Protocol

FY ..... Fiscal Year

G

GB..... Gigabytes

GIF..... Graphics Information File

GILS..... Government Information Locater Service

GMT..... Generic Mapping Tool

GRIB ..... Gridded Binary

H

HDF ..... Hierarchical Data Format

HP..... Hewlett Packard

hPa..... hectoPascal

HTML ..... HyperText Markup Language

HTTP..... Hypertext Transfer Protocol

I

IBM..... International Business Machines

IL ..... Illinois

IRIX..... The main operating system used by Silicon Graphics workstations and servers

ISDN..... Integrated Services Digital Network

J-K-L

LTC ..... Lieutenant Colonel (O5-US Army)

M

M&S ..... Modeling and Simulation

MA..... Maine

MASS ..... MEL Access Site Software

MB..... Megabytes

MD..... Maryland

MEL ..... Master Environmental Library

MHz..... Megahertz

MO..... Missouri

MRSS ..... MEL Resource Site Software

MS..... Mississippi

MSEA..... Modeling and Simulation Executive Agent

MSMP ..... Modeling and Simulation Master Plan

MSOSA ..... Modeling and Simulation Operational Support Activity

MSRR..... Modeling and Simulation Resource Repository

MSU-CAST..... Mississippi State University Center for Air Sea Technology (see CAST)

N

NAVOCEANO ..... Naval Oceanographic Office

NCSA..... National Center for Supercomputer Applications

NE ..... Nebraska

NetCDF ..... Network Common Data Form

NGDC..... National Geophysical Data Center

NIMA ..... National Imagery and Mapping Agency (*formerly Defense Mapping Agency*)

NISO..... National Information Standards Organization

NITFS..... National Imagery Transmission Format Standards

NM..... New Mexico

NORAPS ..... Navy Operational Regional Atmospheric Prediction System

NRL ..... Naval Research Laboratory

NRL-MRY ..... Naval Research Laboratory — Monterey, CA, Marine Meteorology Division, Code 7500

O

OS ..... Operating System

P

Perl..... An interpreted computer language (formerly Practical Extraction and Report Language)

PC ..... Personal Computer

PGP..... Pretty Good™ Privacy

Q-R

RAM ..... Random Access Memory

RISC ..... Reduced Instruction Set Computer

S

SDBF ..... Simulator Data Base Facility

SEDRIS ..... Synthetic Environment Data Representation and Interchange System

SGI ..... Silicon Graphics, Inc.

SIPRNET ..... Secret Internet Protocol Router Network

T

TAC3 ..... Tactical Advanced Computer (3rd contract)

tar ..... Tape Archive (UNIX command)

TEC ..... Topographic Engineering Center

TSGT ..... Technical Sergeant (US Air Force)

U

URL ..... Uniform Resource Locator

USA ..... United States Army

USAF ..... United States Air Force

USN ..... United States Navy

V

VA ..... Virginia

VPF ..... Vector Product Format

W

WAIS ..... Wide Area Information Server

WWW..... World Wide Web

X-Y-Z

APPENDIX C. GLOSSARY

A

AFCCC..... The Air Force Combat Climatology Center develops and produces special weather-impact information used in: a) planning and executing worldwide operations of the military services, unified commands, and allied nations, b) engineering, design, and deployment of weapon systems, c) weather sensitive, multi-billion dollar national programs controlled by the Secretary of the Air Force, and d) DoD lead for air and space weather modeling and simulation.

AFRL..... Air Force Research Laboratory has the mission to create technologies for the warfighter to control and exploit space. Headquartered at Kirkland AFB, NM, the Laboratory has satellite labs at Hanscom AFB, MA and Edwards AFB, CA. AFRL is part of Air Force Materiel Command and reports to and supports the Space and Missile Systems Center at Los Angeles AFB, CA.

AFWA ..... The Air Force Weather Agency has the mission to build the world's most comprehensive data base and apply this information in real-time to satisfy the operational requirements of the national command authorities, DoD, combat forces of the Air Force and Army, and multi-billion dollar weather sensitive AF Precedence 1-1 programs controlled by the Secretary of the Air Force.

ARL ..... Army Research Laboratory executes fundamental and applied research to provide the Army the key technologies and analytical support necessary to assure supremacy in future land warfare.

B

BUFR..... **FM 94-XI BUFR** is the World Meteorological Organization standard format for the Binary Universal Form for the Representation of meteorological data. BUFR is designed to represent meteorological data employing a continuous binary stream.

C

CAST..... Mississippi State University's Center for Air Sea Technology (a.k.a. MSU-CAST) places emphasis on application of numerical ocean models and modeling techniques toward realistic simulation of ocean conditions, particularly the physical and dynamic state of coastal waters and semi-enclosed seas. Although the primary focus is on oceanography, CAST has expanded its efforts to coupled air-ocean modeling and supports the acquisition, storage, and application of meteorological data of all kinds.

CGI..... Common Gateway Interface is the specified standard for communication between HTTP servers and server-side gateway programs. Using CGI specifications the programmer can write simple programs or scripts to process user queries, interrogate databases, and make images that respond to mouse controls.

D

DMSO..... The Defense Modeling and Simulation Office, acting for the Director of Defense Research and Engineering, provides a full time focal point for information concerning DoD Modeling and Simulation (M&S) activities. Currently, the DMSO promulgates M&S policy, initiatives, and guidance to promote cooperation among DoD components to maximize efficiency and effectiveness.

DTED ..... Digital Terrain Elevation Data is provided by NIMA through MEL. It is a uniform matrix of terrain elevation values which provides basic quantitative data for systems and applications that require terrain elevation, slope, and/or surface roughness information. DTED Level 0 elevation post spacing is 30 arc second (nominally, one kilometer).

E-F

FGDC ..... Federal Geographic Data Committee has assumed leadership in the evolution of the National Spatial Data Infrastructure in cooperation with state and local governments, academia and the private sector to establish policies, standards, and procedures for organizations to cooperatively produce and share geospatial data.

G

GRIB ..... **FM 92-X Ext. GRIB (Gridded Binary)** is a standard World Meteorological Organization format for processed binary data expressed in the form of grid-point values

H

HDF ..... Hierarchical Data Format is a National Center for Supercomputing Applications library and platform-independent format for the exchange of scientific data. It includes Fortran and C calling interfaces and utilities for analyzing and converting HDF data files.

HTML ..... Hypertext Markup Language is a scripted computer language specifically designed to specify the logical organization of a text document, with important extensions for hyperlinks and user interaction. Primary format for documents made available on the World Wide Web.

HTTP..... Hypertext Transfer Protocol is a communications protocol used on the World Wide Web for the rapid distribution of hypertext documents.

I-J-K-L-M

MEL ..... Master Environmental Library (*http://mel.dmso.mil*) is a Defense Modeling and Simulation Office project implemented by Modeling and Simulation Executive Agents for Air and Space, Oceanography, and Terrain. MEL is an Internet-based information discovery and retrieval system providing access to oceanographic, meteorological, terrain, and near-space data sets.

MSEA..... Modeling and Simulation Executive Agents are DoD components to whom the Under Secretary of Defense for Acquisition & Technology has assigned responsibility and delegated authority for the development and maintenance of a specific area of Modeling & Simulation (M&S) application, including relevant standards and databases, used by or common to many models and simulations.

MSOSA ..... Modeling and Simulation Operational Support Activity is a subordinate activity of the Defense Modeling and Simulation Office and is responsible for providing support to match customer needs with available modeling and simulation assets. Both the Classified and Unclassified MEL Access Sites will be moved to MSOSA by September 1998.

MSRR..... Modeling and Simulation Resource Repository is a collection of computer resources and information that will assist the Modeling and Simulation community in communication and information sharing. The MSRR Project is sponsored by the Defense Modeling and Simulation Office. MEL is the environmental node of MSRR.

N

NAVOCEANO ..... Naval Oceanographic Office, a subordinate activity of the Naval Oceanography Command, has the mission of providing specialized and unique oceanographic products and services to joint warfighters in a manner and time frame that allows them to meet their objectives.

NCSA..... National Center for Supercomputer Applications is a university-based, high-performance computing facility and research center designed to serve the national computational science and engineering community. Located at the University of Illinois at Urbana-Champaign, NCSA is funded by the National Science Foundation, other federal agencies, the State of Illinois, the University of Illinois, and industrial corporations collaborating through partnership agreements.

NetCDF ..... Network Common Data Form is an interface for scientific data access and a library that provides an implementation of the interface. The NetCDF library also defines a machine-independent format for representing scientific data. Together, the interface, library, and format support the creation, access, and sharing of scientific data.

NGDC..... National Geophysical Data Center manages environmental data in the fields of marine geology and geophysics, paleoclimatology, solar-terrestrial physics, solid earth geophysics, and glaciology (snow and ice).

NIMA ..... National Imagery and Mapping Agency (formerly, Defense Mapping Agency) has central responsibility for imagery and mapping with the mission of providing timely, relevant, and accurate imagery intelligence, and geospatial information in support of national security objectives.

NITFS..... National Imagery Transmission Format Standards are designed to permit the transmission of a file composed of an image accompanied by subimages, symbols, labels, text, and other information that relate to the image. One of the main features of the NITFS is that it allows several items of each data type to be included in one file, yet any data types may be omitted.

NORAPS ..... Navy Operational Regional Atmospheric Prediction System is a relocatable regional primitive equation numerical weather prediction model. It is run at higher horizontal and vertical resolution than the global model for areas of high DoD interest. NORAPS can be initialized either from its own high-resolution nowcast, or from the coarser resolution global model nowcast. It uses lateral boundary conditions provided by the global model and generally provides a more accurate and more detailed depiction of mesoscale weather features than the global model, particularly in areas affected by the land surface.

NRL-MRY ..... Naval Research Laboratory -- Monterey, CA, Marine Meteorology Division, is the only scientific center in the Navy wholly dedicated to atmospheric research. NRL-MRY is responsible for conducting research and development to provide objective local, regional and global atmospheric analysis and prediction as well as the development of automated weather interpretation systems to support Naval operations.

O-P

Perl..... An interpreted computer language optimized for scanning arbitrary text files, extracting information from those text files, and printing reports based on that information. Perl is also a good language for many system management tasks.

PGP..... Pretty Good™ Privacy is a publicly available, high security cryptographic software application which allows people to exchange messages with both privacy and authentication. MIT distributes PGP free for non-commercial use.

Q-R

Resource Site ..... The third tier of MEL made up of resource site databases, extraction and delivery processes. Each participating site must install and run the MEL Resource Site Software on a server connected to the Internet or SIPRNET.

S

SDBF ..... Simulator Data Base Facility is a data repository of simulator data bases with the primary function of the transfer of data base investments between U.S. Government organizations and programs.

T

tar ..... Tape ARchive, a UNIX archive file format, is used to consolidate files.

TEC ..... Topographic Engineering Center is one of four laboratories of the U.S. Army Corps of Engineers The traditional mission of TEC has been to provide America's soldiers and their commanders with superior knowledge of the battlefield and to apply relevant technology to solve civil problems of the nation.

U

URL ..... Uniform Resource Locator is an Internet-specific address specifying the location of information on the World Wide Web (WWW). Usually in the form of `www.dmso.mil`, indicating a domain name (dmso.mil) and the server identifier (www).

V

VPF ..... Vector Product Format is point and vector object information using the terminology and concepts from Department of Defense, 1992, **Vector Product Format (MIL-STD-600006)**.

W

WWW..... World Wide Web is the interconnection of many independent computers world-wide which provides access to information and data bases through the Internet. The WWW is usually accessed through a Web Browser.

X-Y-Z